Rockwell Collins

Washington Office

July 16, 2002

Ms. Magalie Roman Salas
Secretary
Federal Communications Commission
445 12th Street, SW
Washington DC, 20554

Re: WT Docket No. 01-289
Ex Parte Notice

Dear Ms. Salas,

On July 9, 2002, I met with Mr. Jeffrey Tobias, Mr. Marcus Wolf, Mr. Scot Stone, and Mr. Tim Maguire with the Commission and Mr. Ron Breitwisch, Mr. Terry Smith, Mr. John Cirkl with Rockwell Collins as well as Mr. Rohan Hiesler with Inmarsat participated via teleconference. We discussed Rockwell Collins' and Inmarsat's Reply Comments in the above proceeding concerning permitting Inmarsat's Swift64 service into the Aviation Radio Service. Attached is the outline of our discussion. This outline was provided to the meeting participants.

Rockwell Collins provided additional justifications and explanations for our request to modify certain technical regulations under Part 87. In addition to these requested modifications, Inmarsat stressed the fact that Swift64 will provide Priority and Pre-emptive access for safety-of-life communications if Swift64 is permitted to operate under Part 87. In addition, the Commission asked for the spectrum mask data and graph which is also provided herein.

Pursuant to Section 1.1206 of the Commission's Rules, 47 C.F.R. 1.1206, an original and a copy of this letter have been submitted for inclusion in the public record. If you have any questions, please feel free to contact me at 703-516-8213.

Sincerely,

Joseph Cramer
Rockwell Collins, Inc.

Proposed FCC Telecon Agenda

Support or Future Satellite Services in Part 87
(Re: NPRM WT Docket 01-289)

- **Introductions**

- **Purpose of Telecon (Collins – Joe)**
  Questions Encouraged During Discussion

- **Summary of Collins Comments submitted 3/14/02**

  - **Discussion Item A**
    - **Maximum Output Power – Support with technical clarification**
    - **Emission limitations – Support with technical corrections**
  - **Discussion Item E**
    - **Support of Higher Speed Satellite Services**

- **Summary of Collins Reply Comments submitted 4/15/02**

  - **Discussion Item A**
    - **Prefer Elimination of All parameters Related to Modulation Type and Data Rate.**
    - **If not Acceptable, change Parameters to Accommodate INMARSAT Future Data Rates**
    - **If Not Acceptable, At Least Change to Accommodate Current 64 kbps INMARSAT Aero Service**

- **Discussion of Data Rate Related Parameters**
  - **87.131 Emission types**
    16-QAM (D1D, D1E, D1W)
  - **87.133 Frequency Stability**
    Can be relaxed at higher data rates
  - **87.137 Type Of Emission (Authorized Bandwidth)**
    Wider Authorized Bandwidths
  - **87.139 Emission limitations**
    Accommodate 16-QAM (0.25 x SR)
    Wider mask necessary for 3000 bps BPSK
  - **87.141 Modulation Requirement**
    BPSK to 3000 bps, add 16-QAM
  - **87.145 Acceptability of Transmitter for Licensing (Doppler)**
    Eliminate or Align Doppler with SDM +/- 383 Hz for low speed.

- **General Questions and Answers**

1. Purpose of Ex Parte Meeting

Rockwell Collins and Inmarsat would like to provide additional justification in support of modifying Part 87 to accommodate future innovative high speed data transfer to the aviation service, in particular, Inmarsat's new Swift64 service.

Introduction

A. No Technical Limitations:

Rockwell Collins and Inmarsat support the elimination of technical requirements specific to data rates, modulation types, and bandwidth limitations in aviation frequencies not shared with other services. We believe by eliminating these technical regulatory requirements, the Commission will fulfill its desire to accommodate the rapid advances in digital communications technology. These unnecessary technical requirements influence potential interference to adjacent channels and interoperability with ground earth station equipment. Technical requirements can be sufficiently managed by the technical parameters of the satellite system operators (e.g. Inmarsat). Non-conformance of equipment to these parameters would not result in interference to other services operating in other portions of the band.

If the Commission decides not to eliminate specific emission type restrictions, then Rockwell Collins and Inmarsat believe the Commission should incorporate our recommended changes to Part 87.

Background

Inmarsat has developed a new aeronautical satellite service called "Swift64." This service will provide 64 kbps voice and data services for passenger and airline communications. Inmarsat has a similar service in operation for the maritime industry, and is in the final stages of upgrading their ground earth station infrastructure to support the Swift64 aeronautical service.

Current Aeronautical Mobile-Satellite Part 87 regulations are based on the existing Aero-H service. The new Swift64 service operates in the same frequency band, and is designed to share the same High Power Amplifier (HPA) and antenna system as the Aero-H service. Swift64 provides significantly higher data rates than the current Aero-H service. These higher data rates are implemented by using a 16-QAM (Quadrature Amplitude Modulation) waveform at a 33.6 kHz symbol rate over the 1545-1559 MHz (receive) and 1646.5 – 1660.5 MHz (transmit) frequencies. A 3000 bps BPSK modulation type is also utilized for system management. Higher data rates are also being studied for future Inmarsat services.

Therefore, modifications to Part 87 are necessary if this new service is to be accommodated.

Recommended Changes to Part 87

Rockwell Collins submitted proposed changes to Part 87 in our Reply Comments filed on April 15, 2002. Our proposal was derived from the original technical parameters established by Inmarsat's internal requirements. We now offer additional explanation for our proposal:

Specific Recommendations

87.131 Power and Emissions: Add to the "Aircraft Earth" Class of Station the Authorized Emissions: "D1D, D1E, and D1W."

The current 60 Watt power limitation (with modifications proposed in our March 14, 2002 comments) and 2000 Watt EIRP limitation is sufficient to support Swift64 operation. However, the Authorized Emission(s) listed in the table in this Part for the "Aircraft Earth" class of station is not the correct emission designation for 16-QAM modulation. D1D, D1E and D1W will accommodate the Swift64 service as currently defined.

87.133 Frequency Stability: Rockwell Collins and Inmarsat recommend the "Aircraft Earth Station" frequency tolerance requirement either be replaced with a footnote indicating the system must meet the satellite system's technical requirements for protecting adjacent channels, or the limit be increased to +/- 1250 Hz.

The current rules are appropriate for low data rate systems where demodulator bandwidths are narrow, and channels may be closely spaced. However, as higher data rates are implemented, channel spacing increases and frequency tolerance becomes a smaller percentage of the total signal bandwidth. Therefore, frequency tolerance can be relaxed without interfering with adjacent channels.

87.137 Types of Emission: New emission designators with higher bandwidths are necessary to support Swift64 operation. The following additions to the emissions table are necessary to support the Swift64 new service:

Class of Emission	Emission Designator	Authorized Bandwidth (kHz) (Above 50 MHz)
D1D[16*]	40K0D1D	45
D1E[16]	40K0D1E	45
D1W[16]	40K0D1W	45

* Refers to Footnote 16.

Rockwell Collins and Inmarsat recommend that the Emission Designation and Authorized Bandwidth be as flexible as possible to allow future higher data

rate services to be accommodated without requiring continuous changes to Part 87. Emission designations and authorizing bandwidth are parameters utilized primarily to protect adjacent channel interference. Part 87 currently specifies 21K0G1W as the emission designator for Aero-H operation.

Subsequent to the submission of our Reply Comments on April 15, 2002 Inmarsat has identified additional emission designators and bandwidths that will likely be used for higher data rate services. Testing continues to determine the authorized bandwidth requirements for the designators. Once determined, we would like to present these to the Commission for inclusion in the Part 87.137 Table.

87.139 Emission Limitations: To accommodate the current Swift64 service, Part 87.139(i) should be modified to add the emission types D1D, D1E, and D1W. Part 87.139(i)(1) and (i)(4) as proposed in the NPRM (with the clarifications requested in our March 14, 2002 comments) are sufficient with the addition of the Symbol Rate (SR) = 0.25 x channel rate for 16-QAM.

After submission of our Reply Comments on April, 15 2002 we determined that the 3000 bps BPSK signaling channel used for Swift 64 does not employ the same filtering as used by other modulation types. The BPSK signal will (by design) not meet the mask requirements as stated in Part 87.139(i), even after adjustment for symbol rate. However, if the Commission wishes to retain specific limits for all modulation types, we will be happy to provide the appropriate mask for 3000 bps BPSK, as defined by the Inmarsat parameters , for inclusion in this section.

87.141 Modulation Requirements: Rockwell Collins and Inmarsat prefer that Part 87.147(j) be deleted. However, if the Commission retains this provision, then we believe Part 87.147(j) should be modified to state: "Transmitters used at Aircraft Earth Stations must employ BPSK for transmission rates up to and including 3000 bits per second, QPSK for higher data rates up to and including 21000 bits per second, and 16-QAM for data rates above 21000 bits per second."

Satellite systems should be allowed to select the modulation type appropriate for the desired data rates. Advances in technology are permitting more spectrally efficient waveforms (such as 16-QAM) and should be permitted under Part 87. As long as the modulation types are not spread-spectrum, the requirements are only necessary to prevent adjacent channel interference, which can be managed by the individual satellite system's technical requirements.

87.145 Acceptability of Transmitters for Licensing: Part 87.145(d) contains a general requirement that aircraft earth stations must compensate their transmit frequency for Doppler effect relative to the satellite. While the

general Doppler compensation requirement holds true for our new equipment, the specific limit of +/- 335 Hz is unnecessarily restrictive. We recommend that the language be changed to read: "The transmitted signal may not deviate more than +/- 383 Hz from the desired transmit frequency."

Doppler pre-compensation prevents interference with adjacent channels when the signal is received by the satellite, resulting in reduced channel spacing. We feel that the Doppler compensation requirement is not a necessary requirement to be included in Part 87. Even if the Doppler pre-compensation mechanism was rendered inoperative, other satellite systems or services would not experience interference. Doppler pre-compensation can be appropriately managed by the individual satellite system's technical requirements which manage adjacent channel interference and minimize channel spacing.

Spectrum Mask Data

According to Section 87.139(i)(4), the HST-900 transmit signal spectrum must fall under the mask defined by the following points:

3000 BPS

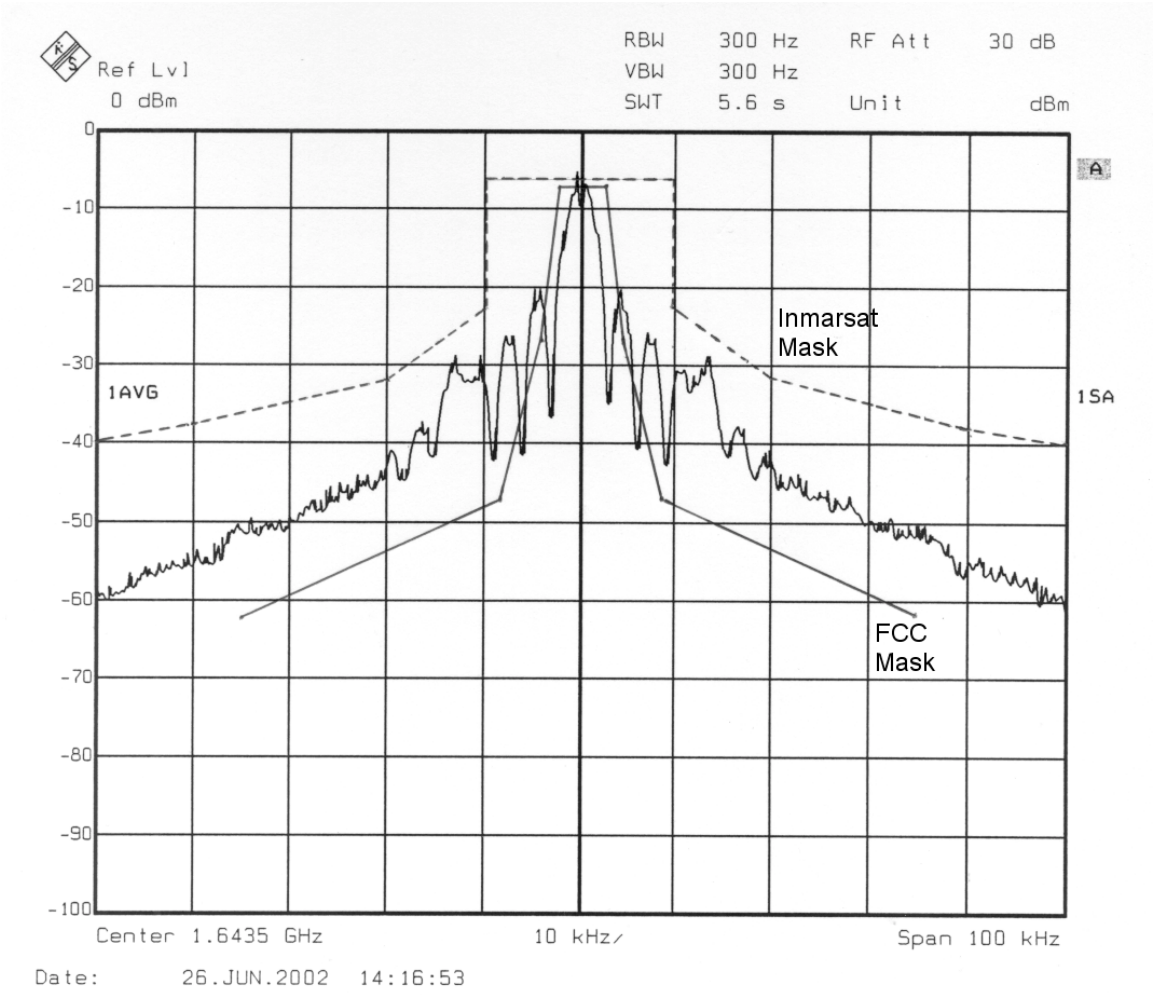
Norm Freq Offset (SR)	Symbol Rate (kHz)	Freq Offset (kHz)	Max Power (W)	Attenuation (dB)
0.75	3	2.25	5	0
1.4	3	4.2	5	20
2.8	3	8.4	5	40
4	3	35	5	55

64000 BPS

Norm Freq Offset (SR)	Symbol Rate (kHz)	Freq Offset (kHz)	Max Power (W)	Attenuation (dB)
0.75	33.6	25.2	25	0
1.4	33.6	47.04	25	20
2.8	33.6	94.08	25	40
4	33.6	134.4	25	55

Test Results

3000 BPS


RBW 300 Hz
RF Att 30 dB
VBW 300 Hz
SWT 5.6 s
Unit dBm
Ref Lvl
0 dBm
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
1AVG
1SA
A
Inmarsat
Mask
FCC
Mask
Center 1.6435 GHz
10 kHz/
Span 100 kHz
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